985-48 Regional Thickening on Gated Tomography for Detection of Reversible Ischemia in Severe Stress Perfusion Defects: Comparison with Resting and 24-hour Redistribution Thallium-201 Images

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Reversible ischemia (REV) in myocardial segments with severe hypoperfusion on stress Tc-99m-sestamibi (MIBI) images was assessed with ECG-gated tomographic (GSPECT) indices of myocardial thickening, as reflected by an increase in regional count density during systole. *Methods:* GSPECT bullseye plots were generated for each of 8 frames acquired after stress MIBI injection in 47 patients with coronary artery disease and at least one severe perfusion defect (PD) on summed SPECT images. Using first harmonic Fourier amplitude (AMP) images, regional myocardial systolic thickening was assessed using a semiautomated algorithm which quantified the stress MIBI activity in regions of interest which contained ≤ 50% of maximal regional activity, and compared this with activity in the corresponding AMP, resting thallium-201 (REST) and 24-hour redistribution (24 HR) images. *Results:* In 53 severe stress PD's, there was a significant correlation between AMP and the regional tracer activity at REST, stress and 24HR (r = 0.46, 0.39 and 0.30, p = 0.0002, 0.0027 and 0.0232, respectively), consistent with the correlation of perfusion and regional thickening. Using a cut-off of 10% improvement on either REST or 24HR images, there were 42 reversible (40 by 24HR vs. only 18 by REST, p = 0.0002) and 11 nonreversible PD's. Using the 24HR defect reversibility as the standard, AMP criteria of >20% normal thickening had only 38% sensitivity and 54% specificity (ROC curve area = 0.56 ± 0.08). *Conclusions:* The 24HR redistribution images delineate a greater degree of PD REV in severe stress MIBI defects than do REST thallium-201 images, most likely due to detection of hibernating, non-contractile myocardium. Thus, regional thickening by GSPECT MIBI polar map Fourier AMP images are an insensitive index of PD REV, when compared with 24HR redistribution images.

985-49 Validation of an Automated Methodology for Determining Left Ventricular Ejection Fraction from Gated SPECT

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Development of a methodology for simultaneous myocardial perfusion imaging and left ventricular functional analysis holds significant promise for clinical application and cost effectiveness in assessing patients with coronary artery disease. An automated method for calculating left ventricular ejection fraction (LVEF) from the results of the CEqual SPECT perfusion processing program has been developed and validated using functional analysis obtained from both multi-crystal camera first pass (MCFP) and single crystal first pass (SCFP) methodology in a study group of 80 patients. *Methods:* Myocardial centerpoint locations produced by the perfusion quantification program were combined with a measure of LV wall thickening based on myocardial count variations over the cardiac cycle to estimate endocardial surface point positions for all time frames. The surface points created a polygon whose volume was calculated to create end diastolic and end systolic volumes and LVEF. First pass functional analysis was performed during the rest injection in 47 patients using standard MCFP software. An additional group of 33 patients underwent functional assessment following a rest injection using a validated SCFP methodology. *Results:* LVEF measured with MCFP ranged from 24 to 77%; Gated SPECT EF correlated as y = 0.65x + 0.22, r = 0.73, p < 0.001. LVEF measured with SCFP ranged from 20 to 88%; Gated SPECT EF correlated as y = 0.74x + 0.16, r = 0.87, p < 0.0008, see = 0.077. The combined assessment of all 80 patients correlated as y = 0.71x + 0.18, r = 0.82, p < 0.0001, see = 0.074. *Conclusions:* Resting left ventricular ejection fractions using an automated gated SPECT functional analysis has high accuracy as compared to two validated first pass functional analysis methodologies. Simultaneous myocardial perfusion with an automated functional assessment should provide accurate and additional diagnostic information.

985-50 Gated SPECT LVEF Measurements Using a Dual-Detector Camera and a Weight-Adjusted Dosage of Thallium-201

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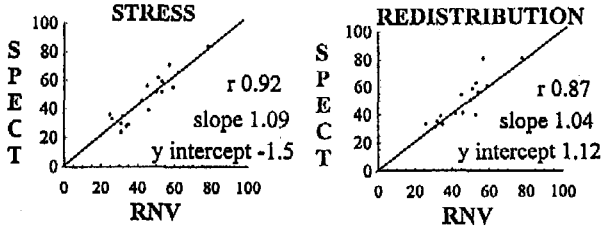
Accurate LVEF measurement from gated SPECT myocardial perfusion studies has been shown for Tc-99m-based agents, but not for Tl-201. To offset lower intrinsic count rates, we optimized Tl-201 acquisitions using a widely available 90º dual-detector camera, low energy all-purpose collimators, a weight-adjusted Tl-201 dosage (range 2.5 mCi for pts <125 lbs to 4.5 mCi for pts >225 lbs), 16 minutes of continuous-mode acquisition and 30%/20% windows on 167/70 kev photopeaks, respectively. Gated images (8 frames/cycle) were acquired post-stress in 19 and at redistribution in 17 pts, rejecting beats ± 20% outside the average R-R cycle. Pts then had immediate post-SPECT gated radionuclide ventriculography (RNV) for 10 minutes (25 mCi Tc-99m; LAO view; 16 frames/cycle). LVEF was computed using commercially-available algorithms for both SPECT (QGS applied to 0.35 cutoff Butterworth filtered images) and RNV. Maximal SPECT cardiac counts ranged from 150–230/pixel. Comparison of LVEFs:



Conclusion: This study demonstrates that LVEF can be accurately quantitated from gated Tl-201 SPECT scans if protocols that provide relatively high count images are used.

986 Endothelial Function

Tuesday, March 18, 1997, 9:00 a.m.–11:00 a.m.
Anaheim Convention Center, Hall E
Presentation Hour: 10:00 a.m.–11:00 a.m.

986-73 A Neutral Endopeptidase Inhibitor Suppresses Atherogenesis and Improves Endothelial Function in Hypercholesterolemic Rabbits

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Neutral endopeptidase (NEP) is a widely distributed ectoenzyme that metabolizes several vasoactive peptides including the natriuretic peptides and kinins. The present study was designed to assess the effects of a NEP inhibitor (NEPI) on vascular reactivity and atherogenesis in male New Zealand White rabbits fed a 1% cholesterol diet for 10 weeks. Animals were either untreated (CHOL, n = 6) or given 20 mg/kg/day of candoxatril, an orally active NEPI, in drinking water (CHOL + NEPI, n = 10). NEPI treatment resulted in significant elevations of plasma atrial natriuretic peptide (ANP) and cyclic GMP, confirming its biologic efficacy. Body weight and blood pressure in the two groups were comparable at baseline and 9 weeks. At the end of the study period, plasma cholesterol and lipoproteins were similar in the two groups. Atheroma in the thoracic aorta, measured by oil red-O staining and expressed as percent area involved, was less in the CHOL + NEPI group (32 ± 4.5% s 48 ± 5%: P < 0.05). Relaxations to acetylcholine (ACh) and ANP in aortic rings precontracted with phenylephrine, were significantly enhanced in the treated group (Table; * P < 0.05).

Conclusion: NEP inhibition suppresses atherogenesis and improves endothelial function in hypercholesterolemic rabbits in the absence of effects on plasma lipids and blood pressure. These findings may have important implications for the treatment of endothelial dysfunction associated with hypercholesterolemia and atherosclerosis.

Vasorelaxations of isolated aortic rings to ACh and ANP

	Maximal Relaxation		EC 50 (-log M)	
	ACh	ANP	ACh	ANP
CHOL	64 ± 6.5	98 ± 1.5	6.4 ± 0.34	8.21 ± 0.05
CHOL + NEPI	87 ± 3.6*	100 ± 0.0	7.0 ± 0.03*	8.37 ± 0.02*

986-74 Dose Response Relation Between Cigarette Consumption and Endothelial Function

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Previous studies showed that endothelial dependent relaxation was impaired in smokers, although no relation has been shown to daily number of smoked cigarettes.